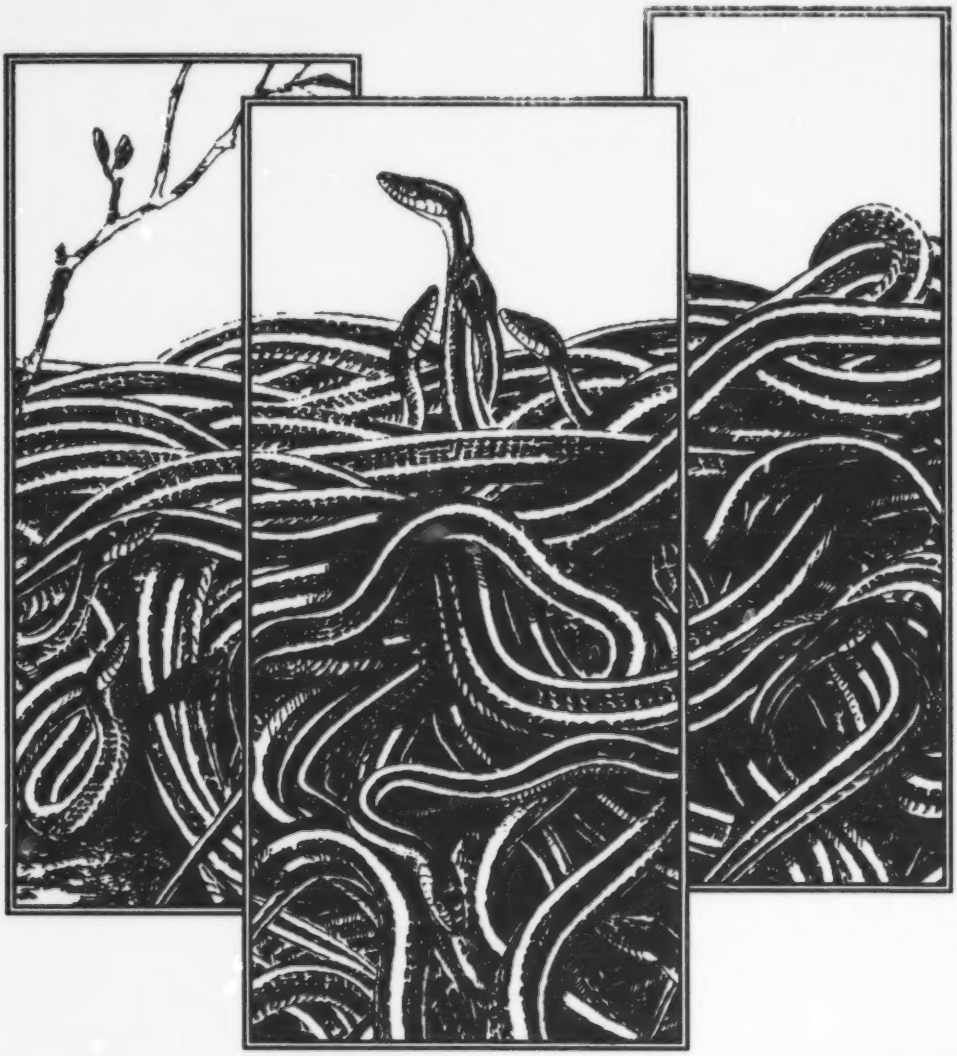

Red-sided Garter Snake Management Plan

Manitoba
Natural Resources
Wildlife

92-02179/

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EXECUTIVE SUMMARY

Red-sided garter snakes range into the coldest climate of any reptile. Adaptations include wintering in communal dens where breeding occurs prior to spring dispersal. Hibernation takes place in sites where snakes find access to crevices below the frost line but above the water table. Ten thousand individuals may use one den, but only a handful of dens contain over 5,000 snakes. Snakes disperse over a 12km radius to summer feeding areas. Snakes using island dens swim to near-by mainlands days after ice break-up. Some island dens contain melanistic (all black) snakes and individuals with unusual color patterns.

Females bear as many as 40 young in a season, but recruitment is slow. About 80% of the young do not survive their first winter. Losses after the first year approach 50% annually for each year class. Snakes do not breed until they are at least 3 to 4 years old; first broods are 1-5. Adult females likely breed every other year. Mortality factors include food shortages, freezing, drowning, predation, road kills, toxic chemicals, commercial harvesting, parasites and diseases.

The Department of Natural Resources intends to encourage scientific studies and educational programs that recognize garter snakes as a vital component of our wildlife heritage. Strategies will focus on sustained yield and consider inputs from all known user groups. Exploitation (harvest or interpretive) will be humane and resource conservation will play an integral role in management decisions. Re-establishment of a snake harvest season would be designed to ensure maximum profits for Manitoba's pickers. It would require active participation by local Indian Bands whereby they would become snake dealers, regulate license holders and keep records of animals sold.

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INTRODUCTION

Background

Red-sided garter snakes have long attracted attention in Manitoba. It was fashionable in the 1880s to picnic at a large hibernaculum near Stony Mountain. That den was at the center of Manitoba's first major labour strike. Penitentiary construction workers refused to work there until the den was destroyed. Other Manitoba communities (Inwood, Skownan, Crane River) happened to be built near or over major snake denning areas. Snakes are gradually being eliminated from these towns. Many dens have been damaged or destroyed by dynamite, oil, fire and the bulldozer. On the positive side, large dens remaining on private land are protected by landowners and Inwood has erected a garter snake monument in recognition of the large population of garter snakes living in the area.

Five species of snakes breed in Manitoba. The red-sided garter snake has the largest range, is the most abundant and is the only species known to occupy large communal dens. Den sites include tree roots, shale cliffs, rock piles, sewers, foundations, animal burrows, rock outcrops and sinkholes. Dens contain from a few to over 10,000, but fewer than 5 dens are known to winter over 5,000 snakes. The four principal threats to snakes are destruction of habitat by humans, chemical pollution, commercial trade and periodic natural catastrophes.

Snake management must ensure that the resource is self-sustaining when considering the future financial, educational and recreational needs of Manitobans. The purpose of this plan is to provide management rationale and guidelines for red-sided garter snakes over the next decade. The goal is to ensure that management efforts effectively deal with resource demands and public expectations. It will help to focus

implementation and provide public awareness for long-term snake conservation in Manitoba.

Objectives of the Plan

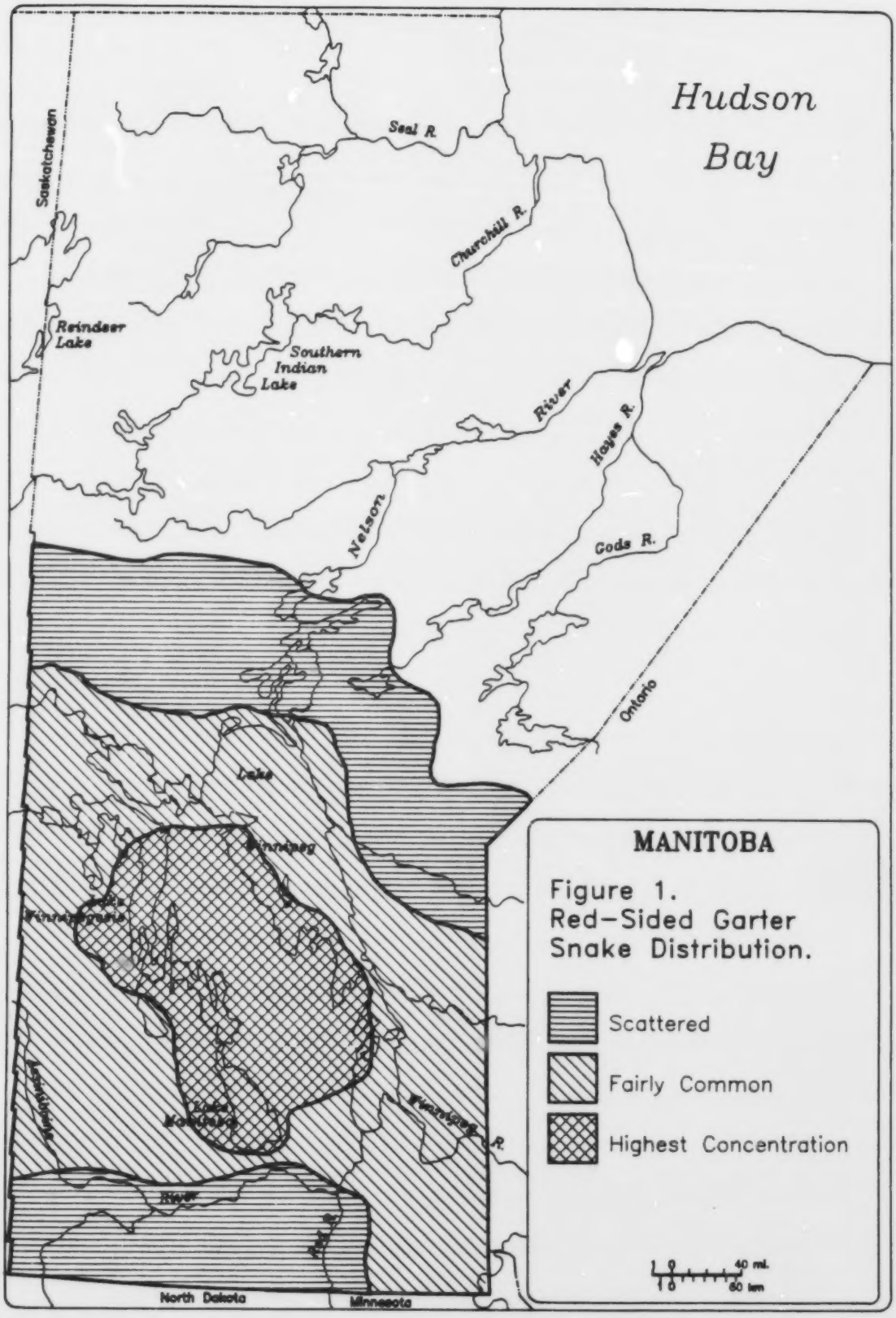
1. To ensure that healthy populations of red-sided garter snakes are maintained throughout their range.
2. To maintain the integrity of major snake denning areas.
3. To foster activities that permit Manitobans to benefit economically from the red-sided garter snake resource.
4. To ensure that interpretive and educational programs emphasize conservation and recognize garter snakes as a vital component of our natural heritage.

BIOLOGICAL INFORMATION

Distribution and Abundance

Red-sided garter snakes occur in suitable habitats throughout much of southern and central Manitoba, especially where denning areas exist near wetlands (Fig. 1). Much of agricultural Manitoba is not suitable because of disturbance and marsh drainage. Roads and road construction, gravel extraction, land use changes and commercial picking have reduced snake numbers generally. Populations in the southeast corner of the province and along the east side of Lake Winnipeg are limited by a lack of den sites, cold temperatures and food scarcity. In western Manitoba, creek and river valley marshes provide summer habitat with major den sites in eroding shale outcrops. Snakes reach the northernmost extent of their range near Flin Flon.

Population densities are greatest in the Interlake where a proliferation of marshes, shallow lakes and poor drainage offer ideal summer habitat and breaks in the


Hudson Bay
Saskatchewan
Seal R.
Churchill R.
Reindeer Lake
Southern Indian Lake
Nelson River
Hayes R.
Gods R.
Ontario
Lake Winnipeg
North Dakota
Minnesota
MANITOBA
Figure 1.
Red-Sided Garter Snake Distribution.
Scattered
Fairly Common
Highest Concentration
0 40 mi.
0 60 km

limestone bedrock provide denning sites. Some dens are on islands where rock outcrops or pressure ridges provide access to suitable wintering habitat.

Population Structure

Snake populations are assumed to contain equal numbers of males and females. Snakes grow throughout life, their length being related to food availability and lifespan. Females are typically larger than males of all year classes. Undisturbed snake dens contain many sizes of snakes, indicating that a number of year classes are present. Dens that have been disturbed or where harvest has occurred typically contain high percentages of small animals. Nearly all snakes more than 90cm long are females over 10 years old while males reach a maximum length of 75cm. The chances of a snake reaching 12 years of age are less than 1 in 5,000.

Parasites/diseases

There are no data to indicate that snake parasites or diseases regulate wild populations. In captive individuals, fungal infections and respiratory problems can be substantial (Narcisse den individuals have been observed with fungal infections). A parasitic fluke often causes wild snakes to lose the ends of their tails and may be responsible for breeding failures. Its incidence varies considerably from year to year and appears related to the fall condition of snakes (poor condition is associated with high fluke infestations).

Natural Predators

Crows, ravens, weasels, mink, raccoons, foxes, ground squirrels, skunks, hawks, owls and other predators kill snakes. Human developments (row crops,

vegetation removal, road building, marsh drainage) can make snakes more vulnerable to natural predators.

Reproductive Capacity

Recruitment for the red-sided garter snake is extremely slow. They do not breed for at least 3 years and likely breed every other year after that. First broods are seldom more than 1-5 young. Approximately 80% of the young do not survive their first winter and 50% of each year class dies annually thereafter. Adult females (over 80cm.) are vital to the well-being of all populations. These females produce as many as 40 young each at least every other year. A snake population cannot increase without a major component of adult females.

Habitat (Current Status)

Ideal summer feeding habitat includes large undisturbed areas containing ample ground cover, moist conditions and an abundance of invertebrates and amphibians. In denning areas, access to moisture (the ground water table) appears to be significant. Much of the provincial red-sided garter snake range has been severely degraded by land development, marsh drainage and road construction. Recent drought conditions have lowered ground water tables and contributed to a shortage of feeding and rearing areas. Of major concern is the protection of large dens, migration corridors, feeding and rearing areas from over-harvest, disturbance and development disruption. More data are required to determine how far and where animals move to feeding areas from specific dens so that migration routes can be preserved. Flooded dens have been difficult to re-establish and dens depleted by over-harvest have shown little sign of recovery. Several dens (Gypsumville Broad Valley) have been severely damaged by

snake pickers using steel bars to pry den structures apart to get at snakes.

Leopard frog die-offs that occurred in the mid-1970's have yet to recover over much of southern Manitoba. Drought in the 1980's has reduced the quality and area of Manitoba's snake habitat. The agricultural use of insecticides has resulted in run-off waters concentrating toxic chemicals in marshes used by snakes in summer. The spraying of roadsides to control grasshoppers and mosquitos degrades snake habitat through toxic contamination and reductions in available food.

MANAGEMENT AND USE

Current System

Although the red-sided garter snake is not threatened, some local populations have been greatly reduced. Snakes have been commercially harvested since the 1950's when a Wisconsin buyer hired local people to collect snakes from Interlake dens. In 1972 the Province attempted to regulate the harvest of red-sided garter snakes by introducing a one-month picking season (September). Pickers were licensed and buyers had to fill out forms indicating numbers of snakes sold to each buyer. The season was reduced to one week in 1975. The Department increased the season to two weeks (September 1-14) in 1983 to compensate for days when inclement weather prevented picking activities. Declines in snake populations at various dens, drought conditions, land use developments, successive years of high harvest, and the use of mechanical devices (pry bars) to extract snakes, contributed to a season moratorium in 1989. This moratorium will allow time to develop management, monitoring and commercial strategies for the species while protecting populations at major dens.

It was thought that most harvested snakes were used in universities for

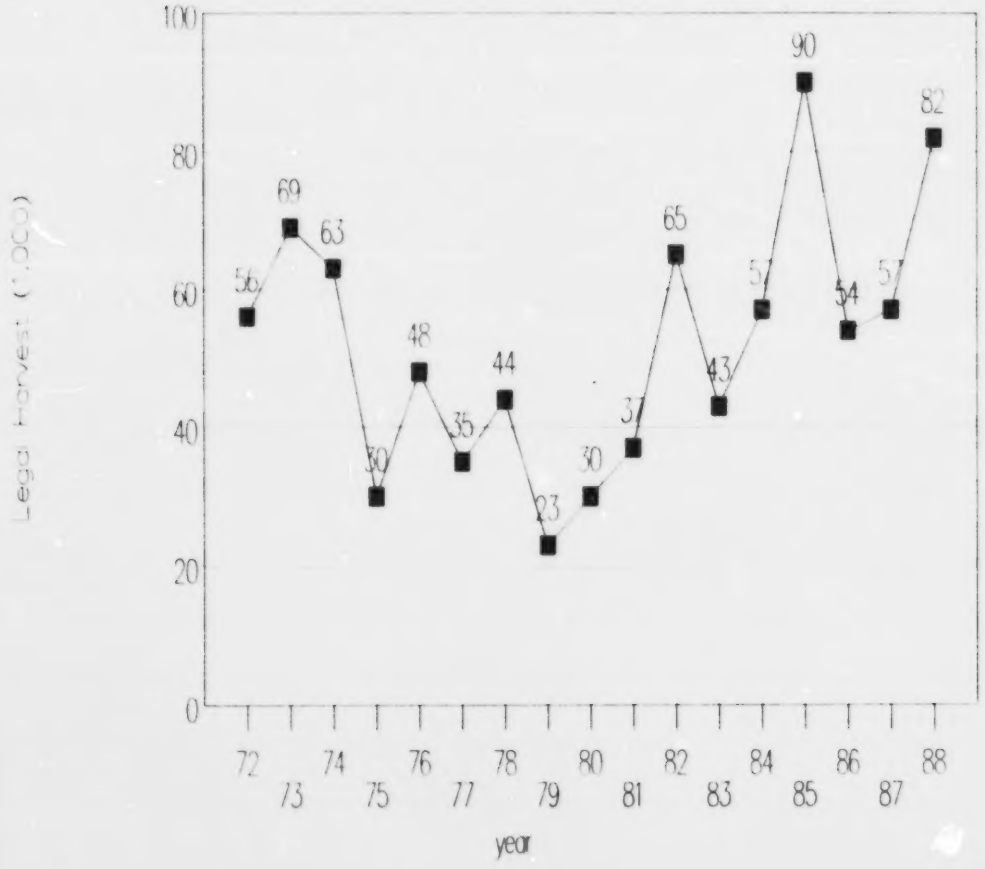
teaching with smaller numbers going to research, but most were going into the pet trade. During the fall of 1989, fewer than 500 snakes were requested for scientific studies and none for educational lab work. Snakes have been sent to many parts of the world with exports to England, Sweden, France and the United States. Documentation that at least 5 island dens contain genetically aberrant individuals will likely rekindle scientific interest.

Legal Harvest

No direct data are available on the snake harvest prior to 1972. Branch correspondence and files indicate that a few individuals gathered snakes for a Wisconsin biological supply house. The numbers recorded as legally harvested and sold to outside dealers annually (1972-1988) ranged from 23,000 to 90,000, averaging over 50,000 each year (Table 1). Illegal harvest numbers are unknown. The numbers of snakes that died in storage or were discarded by pickers unable to find buyers is also unknown.

Several Manitoba dealers hired people to pick snakes. There were also buyers from the United States and elsewhere who bought directly from pickers. The number of Manitoba dealers ranged from one to four. The higher numbers were recent with one or two the norm prior to 1984. The number of buyers, primarily from the United States, has varied annually with Wisconsin being consistent throughout. Snakes have been sold to buyers from a number of states and European countries. Most of these buyers were irregular and the snake market has been uncertain for pickers. This uncertainty led to pre-season picking and the development of mechanical devices to take snakes quickly for immediate sale.

Table 1: Red-Sided Garter Snakes In Manitoba (1972-1988)



When the snake season was established, the existing amphibian license was expanded to include reptiles. Many people involved in the frog harvest were already picking snakes or began soon after the season was established. The holder of a Reptile and Amphibian License could legally pursue either frogs or snakes or both. In addition, individual or family licenses could be purchased. It has been difficult to separate snake pickers from the license holders and impossible to number those involved in family licenses. The best estimate is that snake pickers increased over time from 10-12 to nearly 150 by the late 1980's.

Research

Research studies began in the late 1960's when University of Manitoba students working on snakes at the Inwood dens studied cold tolerances, homing, temperature changes, environmental control of seasonal reproductive cycles and niche comparisons between plains and red-sided garter snakes.

Extremely high water levels in 1974 resulted in most Inwood dens being abandoned. Studies moved to the Narcisse area where researchers came from Harvard University and the University of Texas to study hormonal control, seminal plug influence, life history parameters, mating, behaviour stimuli, and gonadectomizing. Between 1980 and 1985, Texas students produced scientific papers dealing primarily with chemical communication and pheromones. Between 1985 and 1990, research topics included light sensitivities, hormonal levels, pheromones, courtship, gland functions, reproductive cycles, parasites, thermal stimuli, skin lipids, genetic markers, the evolution of mechanisms controlling mating behaviour, picking effects on local populations and den restocking. This work was primarily done by graduate students from Texas but

included researchers from Oregon, Manitoba, Washington D.C., Illinois and Kansas. Analysis of genetic make-up from blood samples indicated that snakes from a Lake Winnipegosis island were genetically more different from Narcisse snakes than Narcisse snakes were from snakes in a Kansas den.

Public Education

Many newspapers and numerous popular and nature magazines have published articles about Manitoba snakes. These include National Geographic, Manitoba Nature, Scientific American, Equinox, Nature Canada, Science, Copeia, The Manitoba Resource Officer and others. Other articles have appeared in England, France, the United States and other countries. Film footage has been gathered for several movies, documentaries and a SESAME Street segment.

Public Viewing/Tourism

Since 1980 the Department has developed nature and interpretive tours to specific snake dens near Narcisse. These dens have been closed to legal picking since 1984. Protecting the dens from commercial pickers was an annual problem until the season was closed provincially. Snake life history brochures have been produced which include directions on how to get there. The area receives media advertising annually. Facilities include information and directional signs, a gravelled parking lot, benches, a picnic area and pit toilets. A spring interpretive program is run at peak visitation periods. The dens, which are visited by nearly 10,000 people annually, have traditionally been places where visitors can have a hands-on experience with snakes. Numerous school groups visit annually. As numbers of visitors increase, vegetation and viewing

quality decline. Site management is underway to protect the dens from subsequent erosion and disturbance. With visitor increases the Branch is developing a less active hands-on visitor participation approach. This will allow large numbers of visitors to the den areas with little or no damage to the den sites.

Economic Alternatives

The average annual gross income from snake picking was $26,000 (52,000 snakes at $0.50 each) between 1971 and 1989. To some this was an appreciable part of a diversified income. Over time, depletions of snake populations close to where pickers lived forced many pickers to travel greater distances to collect snakes. The moratorium on picking cut off a revenue source and ended a fall activity for a number of people. It is difficult for a person who sees a snake as something he can sell to not be able to sell it, especially when many snakes are crushed on roadways. The option to re-open the season demands that the resource can sustain yields. An improved awareness and appreciation of snakes by both pickers and managers will help focus resource-based management options.

Captive Rearing

A captive rearing facility in Manitoba could produce animals for commercial purposes (Captive breeding supplies a portion of the research needs at the University of Texas). Such a facility is currently being researched by a University of Manitoba student. Since efforts to raise amphibians and reptiles in captivity have had poor success elsewhere, such efforts should be closely monitored. A pilot study would be a good beginning as problems (parasites and diseases) will likely require treatment before a full-

scale breeding facility can get into operation. Breeding a strain of melanistic snakes could produce animals individually worth considerably more than the current value of normally colored animals.

Manitoba pickers received approximately $.50 per snake throughout the period a season existed and biological supply houses charged $5.00-$25.00 per animal during that time. If a commercial snake business is re-established, every effort should be made to ensure that Manitobans receive the highest possible return per snake. This could be achieved by encouraging a local developer to set up a Manitoba biological supply house. Such a facility could collect, keep and distribute snakes to buyers all over the world. It could be regulated to ensure that snakes are kept in the best possible conditions. Such a business should consider adding frogs and salamanders to the snake operation. Indian Band lands along Lake Manitoba have excellent habitat for such a venture and access to development capital through federal programs.

Monitoring Wild Populations

Resource stability must be the major consideration in all decisions for commercial, educational or interpretive programs regarding the red-sided garter snake. Snakes are environmental indicators whose populations respond to habitat degeneration. Several dens will be monitored annually to determine population trends and status.

Snakes are cold-blooded reptiles whose activities are closely tied to climate. Survey standards are difficult because den microclimates vary considerably from each other and from surrounding habitats. Seldom do adjacent dens have the same activity level on a given day. Sampling a representative number of dens over long periods of time requires that each den be quickly surveyed and that different observers will not

bias the results. Surveys will be recorded on standard forms which include environmental, activity and numbers data (Fig. II). Photographs will be taken of major snake concentrations at each site during each survey. Each survey will include walking about the den area to estimate snake numbers and activity in and around den sites. Snake population changes will be identified on a den by den basis. It is suggested that the snake interpreters conduct surveys and monitor activity at the Narcisse dens.

Figure II

SNAKE DEN OBSERVATION DATA FORM

Observer_____Date_____Time_____Temperature_____

Cloud Cover_____Wind_____

Den Site_____

Estimated No. Snakes in Den_____Outside Den_____

Snake Activity_____

Courtship, Number of Breeding Balls_____Sizes_____

Locations related to the Den_____Courtship, none_____

Small amount_____Active_____Very Active_____

Condition of Snakes, Especially Females_____

Number of People Present_____Den Condition_____

Remarks_____

_____

_____

A daily survey should be made of dead snakes in the parking lot and along the road immediately west of the Narcisse viewing area. Dead snakes should be picked up and their kill locations recorded. These data will assist in developing future management strategies and prevent visitors from seeing large numbers of crushed snakes.

Harvest

As custodians of the snake resource we need to ensure that snakes remain an integral part of the native fauna. Regulations will ensure that snake populations are sustained throughout the harvest zones. Pickers may also be licensed to provide animals for scientific research facilities and to collect animals in areas where snakes are considered a health threat or public nuisance. Sustained yield, maximum local resource dollars and promotion of the resource in the best possible light are essential harvest components.

Public Education

It is the Department's mandate to ensure that renewable resources are sustained and that they benefit as many Manitobans as possible. Brochures, public viewing areas, school seminars, interpretation and education will continue as Branch initiatives. In all educational ventures, the red-sided garter snake will be portrayed as a part of our natural heritage and receive as much respect and protection as any native wildlife species.

Manitoba snake dens come in many forms and contain various numbers of snakes. Den development to provide local income requires consideration. Snake viewing has been a Manitoba tradition since the mid-1880's. The Narcisse snake viewing

and interpretation area was established as a hands-on experience in 1984. It provides an educational experience for people of all ages and has had tremendous value in creating public appreciation for reptiles. Many people visiting this facility have been able to overcome their fear of snakes.

When large numbers of people interact with snakes there are management problems related to environmental factors, human access and resource interpretation. Environmental factors include direct disturbance of animals by humans, den disturbance, erosion of the den areas, summer habitat degradation, increased predation and barriers to summering habitats. Too many people in or near the dens cause changes in snake breeding and movement activities. People also adversely affect den areas by moving rocks, trampling vegetation or by throwing things into dens jeopardizing entry into wintering cavities. Soil and debris plugs entrance holes and den structures gradually break down. A lack of cover near the den results in drier, less shady conditions, rapid temperature and humidity changes and increased predation. Human activities disturb the snakes directly and expose them to unnatural obstacles when they move from den sites to summer feeding areas.

No attempt has been made to identify, protect, enhance or secure travel routes to summer habitat near the Narcisse dens. Information on summering areas is essential to ensure that such routes are protected. Public access, direction signs, vehicle parking, crowd control and collecting are major considerations at all public viewing areas.

Interpretation can take two forms: passive (using signs, fencing, walkways, and self-guiding trails) or active (where interpreters and guides lead the public through explanations of history, biology, ecology and various aspects of snake management and

behaviour). The presence of interpreters is essential when large numbers of people are visiting the dens at one time, or when school groups arrive with no prior information. Pre-registration of school groups should be required. An educational package including chaperone requirements should be provided prior to their arrival.

The proper development of signs, walkways, fences, and parking facilities along with programs to ensure that school groups have been properly briefed and include ample numbers of chaperones will reduce the need for interpreters. On days when large numbers of visitors are out, interpreters are needed at each den site. As more people collectively enter the den areas, snakes have less educational value and interpreters are necessary to control crowds and focus visitor attention on the educational opportunity at hand. Without such interpretation the resource will suffer and the experience will do little to enhance visitor education or appreciation.

MANAGEMENT RECOMMENDATIONS FOR 1991-1995

Research

Scientific studies will be encouraged with some provincial grant and support cost funding, especially for those proposals with management implications. Management and biological information needs include public perception, snake movement corridors, summer use areas, homing, annual productivity, survival, denning areas for young, and captive breeding. To help determine if snake numbers are in decline, populations at the three main Narcisse dens, the supplemental den near Inwood Quarry and the re-established den near Inwood will be monitored annually using scientific techniques, photographs and data forms.

Public Use/Education

Adequate resources (seasonal staff) will be available to manage visitors and school groups, spring and fall, at dens open to public viewing. Facility improvements and measures to protect public viewing dens will be of highest priority on an ongoing basis. To limit habitat deterioration at public viewing dens, visitation areas will be monitored by regional Wildlife Branch representatives annually and actions will be ongoing to protect dens, migration routes and summer feeding areas.

Harvest

The re-establishment of a snake season will depend upon whether the resource can maintain a sustained harvest within designated picking areas. Dialogue with and input from Interlake residents, especially Indian Bands, will take place prior to the re-establishment of a snake harvest season. A snake harvest quota would be established based upon supply and demand. The harvest should be the first two weeks of September with harvest quotas and picking areas based upon past Native Band member activity (Dog Creek, Crane River, Peguis). Reserves would be allowed a certain number of snakes based on current levels of demand (presently 20,000). The bands would be comanagers and act as snake dealers, maintaining records of animals sold. Regional Natural Resources field staff would provide export permits and obtain sales records.

This proposal eliminates Manitoba dealers putting that responsibility in the hands of involved native bands. Former dealers could be employed by the bands. It would provide buyers direct contact with snake sources and ensure that pickers receive the best possible price for their snakes. It requires considerable band involvement in

the collection and sale of a local resource. If such a harvest is re-established, it is proposed that: 1) To reduce den area destruction, the use of mechanical devices (crowbars) and the plugging of den entrances (tarpaper, den substrate altering) be prohibited by legislation. 2) To limit pre-season picking, den area patrols should be increased and buyers should not be allowed to purchase animals until day three of the season. 3) To determine who the snake pickers are, the amphibian and reptile licenses will be separated. 4) To ensure sustained yield of this resource, no snakes over 70cm or under 45cm can be sold (a system similar to the Registered Traplines may be established or a system of resting dens for 1-3 years may be implemented). 5) To reduce illegal sales of snakes, customs authorities at Winnipeg International Airport and border crossings should be aware of regulations as should authorities at export points in other provinces where legislation protecting snakes does not exist.

Critical Den Protection

The den on Brigadoon Creek near Reeder is in a shale bank that is deteriorating especially during these times of drought. It is not suitable for visitation and will receive complete protection from picking. A permit should be required in order to visit the site. Numbers of snakes should be monitored annually from vantage points at the base of the den. Measures to protect the den from further natural deterioration and from visitor encroachment will be considered.

Snake Island, just southeast of Winnipegosis in Lake Winnipegosis, should receive complete protection from harvest. This den has been viewed by local people since at least the 1920's and should remain as a local viewing area. The den is also significant because it contains some melanistic snakes, rare in the reptile world.

Spruce Island, in Lake Winnipegosis just north of Salt Point, contains large numbers of snakes with unusual color patterns. It is "a gold mine for genetic studies" according to Dr. R. Mason, (Oregon State University), an endangered species and reptile expert. It may be developed for nonconsumptive uses and provide a limited number of animals for research. It may also provide breeding stock for an attempt at developing a pure strain of melanistic snakes for captive propagation. It probably contains the largest number of wintering snakes in a single den and the most unusually colored snakes in Manitoba. It will not be open to commercial harvest.

The Narcisse dens and the dens in the Chatfield Community Pasture currently off limits to pickers, need more stringent enforcement as do dens in the Inwood area. Other dens may need and will receive protection as they are identified.

Resource Overview

The red-sided garter snake plays a major role in southern Manitoba's ecosystems. It is threatened by many environmental factors and is valued by several user groups (science, education, commercial harvest, viewing). Future management requires that sustained yield be achieved. To balance the user needs with the resource availability is a challenge that will require population stabilization. This will require population monitoring, protective legislation, protection of habitats from destructive land use practices and inputs from user groups and local residents.

Summary of Recommended Action

1. Encourage scientific study of the population ecology, movements and captive breeding of garter snakes.

2. Monitor relative abundance of garter snakes at key dens during spring emergence.

3. Provide adequate resources to maintain the current and anticipated level of public viewing at the Narcisse dens.
   - completion of boardwalks
   - seasonal staff
   - public information (brochure, etc.)

4. Re-establish garter snake season if warranted based on May population surveys, general physical condition of females, and demand for the resource.

5. Discuss harvest and use alternatives with native people in comanagement forums.

6. Support a study of the socio-economic alternatives of harvest and other uses.

7. Prohibit the destruction of habitat during the harvest with legislation.

8. Protect fragile denning areas at Reeder, Snake Island and Spruce Island from all human access and use except by permit.